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PATENT APPLICATION

ATTORNEY DOCKET NO. 200315934-1

IN THE
UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor(s): Winthrop D. Childers et al.

Confirmation No.: 2745

Application No.: 10/817,012

Examiner: SHEPARD, Justin E.

Filing Date: April 1, 2004

Group Art Unit: 2623

Title: Method and System for Displaying an Image in Three Dimensions

Mail Stop Appeal Brief-Patents
Commissioner For Patents
PO Box 1450
Alexandria, VA 22313-1450

TRANSMITTAL OF APPEAL BRIEF

Transmitted herewith is the Appeal Brief in this application with respect to the Notice of Appeal filed on July 5, 2006, and the Final Office Action mailed on November 24, 2006.

The fee for filing this Appeal Brief is (37 CFR 1.17(c)) $500.00.

(complete (a) or (b) as applicable)

The proceedings herein are for a patent application and the provisions of 37 CFR 1.136(a) apply.

☐ (a) Applicant petitions for an extension of time under 37 CFR 1.136 (fees: 37 CFR 1.17(a)-(d)) for the total number of months checked below:

☐ 1st Month $120	☐ 2nd Month $450	☐ 3rd Month $1020	☐ 4th Month $1590

☐ The extension fee has already been filed in this application.

☒ (b) Applicant believes that no extension of time is required. However, this conditional petition is being made to provide for the possibility that applicant has inadvertently overlooked the need for a petition and fee for extension of time.

Please charge to Deposit Account 08-2025 the sum of $ 500. At any time during the pendency of this application, please charge any fees required or credit any over payment to Deposit Account 08-2025 pursuant to 37 CFR 1.25. Additionally please charge any fees to Deposit Account 08-2025 under 37 CFR 1.16 through 1.21 inclusive, and any other sections in Title 37 of the Code of Federal Regulations that may regulate fees. A duplicate copy of this sheet is enclosed.

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Respectfully submitted,

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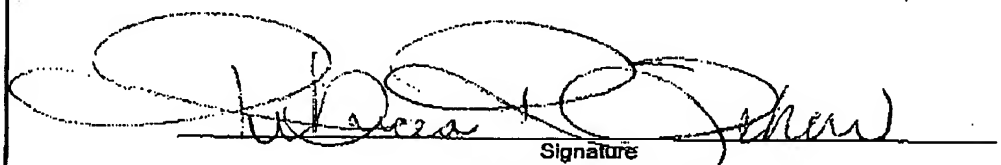

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1. Transmittal of Appeal Brief with Duplicate Copy (2 pages)
2. Certificate of Transmission (1 page)
3. Appeal Brief (37 pages)

200315934-1

10/817,012

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In the Patent Application of

Winthrop D. Childers et al.

Application No. 10/817,012

Filed: April 1, 2004

For: Method and System for Displaying an Image in Three Dimensions

Group Art Unit: 2623

Examiner: SHEPARD, Justin E.

APPEAL BRIEF

Mail Stop Appeal Brief - Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

In response to Appellant's initial Appeal Brief in this application, the Examiner reopened prosecution with a *final* Office Action dated November 24, 2006 (the "final Office Action"). This new final Office Action leaves substantially unchanged the issues for which Appellant first instituted an appeal in this application. Consequently, in response to the final Office Action of November 24, 2006, Appellant hereby requests reinstatement of its previous appeal. As required for reinstatement of the appeal, this is a second Appeal Brief under Rule 41.37 appealing the final decision of the Primary Examiner dated November 24, 2006 and containing each of the topics required by Rule 41.37.

I. Real Party in Interest

The real party in interest is Hewlett-Packard Development Company, LP, a limited partnership established under the laws of the State of Texas and having a principal place of business at 20555 S.H. 249 Houston, TX 77070, U.S.A. (hereinafter "HPDC"). HPDC is a Texas limited partnership and is a wholly-owned affiliate of Hewlett-Packard Company, a Delaware Corporation, headquartered in Palo Alto, CA. The general or managing partner of HPDC is HPQ Holdings, LLC.

II. Related Appeals and Interferences

There are no appeals or interferences related to the present application of which the Appellants are aware.

III. Status of Claims

Claims 59 and 60 have been withdrawn from consideration pursuant to a Restriction Requirement. Thus, claims 1-58 and 61-67 are currently pending.

The final Office Action indicated the presence of allowable subject matter in claims 11, and 24-26.

Consequently, Appellant appeals from the final rejection of the other claims 1-10, 12-23, 27-58 and 61-67. All pending claims are presented in the Appendix.

IV. Status of Amendments

Appellant has not filed any amendments subsequent to the final Office Action of November 24, 2006

V. Summary of Claimed Subject Matter

Projection systems are becoming increasingly common-place in the home theatre venue and are often used to display movies and computer images. Projection systems are also popular among video game enthusiasts because of their rich and vibrant display capabilities. It is often desirable for a projector system to produce stereoscopic or three dimensional (3D) images such as 3D movies and 3D video games. Typically, the projection of 3D images requires two separate image projectors, one dedicated to projecting left eye images, and the other dedicated to projecting right eye images. The left and right images are displayed in spatially offset positions on a suitable viewing surface. The left and right images each carry different perspectives. By viewing the images through glasses configured to allow the left image to be perceived by only the left eye and the right image to be perceived by only the right eye, a viewer is able to see a single composite 3D image. (Appellant's specification, paragraphs 0002-3).

Appellant's application discloses a method and system for displaying an image frame in 3D or in 2D with a single light engine. The light engine is configured to operate in either a 3D mode of operation or in a 2D mode of operation. The mode of operation may be selected by a user of the light engine, for example. The light engine may comprise a spatial light modulator and an image processing unit configured to control the operation of the spatial light modulator. In one exemplary embodiment, if the light engine is operating in a 3D mode of operation, the image processing unit may generate left and right image sub-frame data, which is used by the spatial light modulator to generate left and right image sub-frames. The left and right image sub-frames may then be displayed on a viewing surface each carrying different perspectives during a single frame period such that a 3D image is perceived by a viewer wearing special 3D glasses. The left image sub-frame may include a first group of

colors (such as a first set of primary colors) and the right image sub-frame may include a second group of colors (such as a second set of primary colors) distinct from the first group of colors. In another exemplary embodiment, if the light engine is operating in a 2D mode of operation, the image processing unit may generate 2D image frame data, which is used by the spatial light modulator to generate a 2D image frame. The 2D image frame may then be displayed on the viewing surface during the single frame period such that a 2D image is perceived by a viewer. The 2D image frame may include some or all of the colors in the first and second groups of colors. (Appellant's specification, paragraphs 0019-20).

In one exemplary embodiment, each of the left and right sub-frames includes at least a nearly complete set of color primaries. By way of an illustrative embodiment for the following examples the left image sub-frame includes a first set of color primaries including red, green, and blue and the right image sub-frame includes a second set of color primaries including cyan, yellow, and magenta. (Appellant's specification, paragraphs 0040).

As shown in Fig. 1, image data is input into an image processing unit (106). The image data defines an image that is to be displayed by the display system (100). The image processing unit (106) performs various functions including controlling the illumination of a light source (101) and controlling a spatial light modulator (SLM) (103). The light source (101) may provide a beam of light to a color device (102). The color device (102) enables the display system (100) to display a color image. The color device (102) may be, but is not limited to, a sequential color device or scrolling color device, for example. Alternatively, the color device (102) may be a "parallel" color device such as an arrangement of dichroic mirrors that split light into primary colored light, such as red, green, and blue light. An alternate embodiment does not include a color device (102). (Appellant's specification, paragraphs 0023-4).

Light transmitted by the color device (102) may be focused onto the SLM (103) through a lens or through some other device (not shown). An SLM is a device that modulates incident light in a spatial pattern corresponding to an electrical or optical input. The terms "SLM" and "modulator" will be used interchangeably herein to refer to a spatial light modulator. The incident light may be modulated in its phase, intensity, polarization, direction, wavelength, color, hue, or any other property inherent to light by the modulator (103). Thus, the SLM (103) of Fig. 1 modulates the light output by the color device (102) based on input from the image processing unit (106) to form an image bearing beam of light that is eventually projected by display optics (104) onto a viewing surface (105) such as a screen. The display optics (104) may be for, for example, a lens configured to project and focus an image onto a viewing surface. (Appellant's specification, paragraphs 0025).

With regard to specific claims at issue on this appeal, claim 1 recites a method of displaying an image frame by projection in three dimensions (3D) or in two dimensions (2D) with a projection system, said method comprising: selecting between a 2D mode of operation and a separate 3D mode of operation for said projection system (Appellant's Fig. 11, element 190; and paragraph 0058); generating and projecting a left image sub-frame and a right image sub-frame during a frame period if said 3D mode of operation for said projection system is selected (Appellant's Fig. 11, element 195; and paragraph 0060); and generating and projecting only a 2D image frame during said frame period if said 2D mode of operation for said projection system is selected (Appellant's Fig. 11, element 191; and paragraph 0059); wherein said left image sub-frame defines a visual perspective of a left eye and said right image sub-frame defines a visual perspective of a right eye (Appellant's specification, paragraph 0038).

Claim 19 recites a method of displaying an image in three dimensions during a frame period, said method comprising: generating a left image sub-frame and a right image sub-frame, said left image sub-frame defining a visual perspective of a left eye and said right image sub-frame defining a visual perspective of a right eye for said image (Appellant's specification, paragraph 0019); displaying said left image sub-frame with an electronic display system (Appellant's Fig. 1, elements 107, 103, 104 and 105), wherein said electronic display system outputs a display of said left image sub-frame utilizing a first plurality of colors (Appellant's specification, paragraph 0019); and displaying said right image sub-frame with said display system, wherein said display system outputs a display of said right image sub-frame utilizing a second plurality of colors; (Appellant's specification, paragraph 0019) wherein said first plurality of colors is distinct from said second plurality of colors (Appellant's specification, paragraph 0019).

Claim 27 recites a display system with a selectable mode of operation for displaying an image frame in three dimensions (3D) or in two dimensions (2D), said system comprising: a spatial light modulator (Appellant's specification, Fig. 1, element 103); and an image processing unit (Appellant's specification, Fig. 1, element 107) configured to control said spatial light modulator in a selected mode of operation which is either a 3D mode of operation or a 2D mode of operation (Appellant's specification, Fig. 11, element 190); wherein if said selected mode of operation is said 3D mode of operation, said image processing unit outputs to said spatial light modulator a left image sub-frame carrying a left eye perspective and a right image sub-frame carrying a right eye perspective during a frame period (Appellant's Fig. 11, element 195; and paragraph 0060) and, if said selected mode of operation is said 2D mode of operation, said image processing unit outputs to said spatial

light modulator a 2D image frame to be displayed on a viewing surface during said frame period (Appellant's Fig. 11, element 191; and paragraph 0059).

Claim 48 recites a 3D imaging device, comprising: an image processing unit (Appellant's specification, Fig. 1, element 106) configured to generate image sub-frame data; and a color modulator (Appellant's specification, Fig. 1, elements 102 and 103) electronically coupled to said image processing unit (106) and configured to generate a plurality of image sub-frames based on said image sub-frame data; wherein said color modulator uses a first plurality of colors to output at least one image sub-frame of said plurality of image sub-frames and a second plurality of colors, distinct from said first plurality of colors, to output at least one other image sub-frame of said plurality of image sub-frames (Appellant's specification, paragraph 0019).

Claim 61 recites a system for displaying an image frame by projection in three dimensions (3D) or in two dimensions (2D) with a projection system, said system comprising: means for selecting between a 2D mode of operation and a separate 3D mode of operation for said projection system (Appellant's specification, Fig. 4, element 106); means for generating and projecting a left image sub-frame and a right image sub-frame if said 3D mode of operation is selected for said projection system (Appellant's specification, Fig. 4, elements 130, 132, 133, 107, 103 and 104); and means for generating and projecting a 2D image frame if said 2D mode of operation is selected for said projection system (Appellant's specification, Fig. 4, elements 131, 134, 107, 103 and 104; wherein said left and right image sub-frames are left and right perspectives during a frame period if said 3D mode of operation is selected (Appellant's specification, paragraph 0019) and said 2D image frame is displayed during said frame period if said 2D mode of operation is selected; wherein said 2D image

frame does not comprise sub-frames having different perspectives (Appellant's Fig. 11, element 191; and paragraph 0059).

Claim 66 recites a system for displaying an image in three dimensions during a frame period, said system comprising: means for generating a left image sub-frame and a right image sub-frame (Appellant's specification, Fig. 4, elements 130, 132, 133, 107, 103 and 104), said left image sub-frame defining a visual perspective of a left eye and said right image sub-frame defining a visual perspective of a right eye for said image (Appellant's specification, paragraph 0019); means for electronically displaying said left image sub-frame utilizing a first plurality of colors to compose the display of the left image sub-frame (Appellant's specification, Fig. 4, elements 130, 132, 133, 107, 102, 103 and 104); and means for electronically displaying said right image sub-frame utilizing a second plurality of colors to compose the display of the right image sub-frame (Appellant's specification, Fig. 4, elements 130, 132, 133, 107, 102, 103 and 104); wherein said first plurality of colors is distinct from said second plurality of colors (Appellant's specification, paragraph 0019).

Claim 20 recites wherein said first plurality of colors and said second plurality of colors comprise different sets of primary colors (Appellant's specification, paragraphs 0019 and 0040). Claim 49 recites wherein said first plurality of colors and said second plurality of colors comprise different sets of primary colors (Appellant's specification, paragraphs 0019 and 0040).

VI. Grounds of Rejection to be Reviewed on Appeal

In the final Office Action, 20 separate grounds of rejection were made as follows.

(1) Claims 19-23, 48, 49, 53, 55, 56 and 66 were rejected as anticipated under 35 U.S.C. § 102(e) by U.S. Patent Application Publication No. 2003/0112507 to Divelbiss et al. ("Divelbiss").

(2) Claims 27-29, 33-35, 45 and 46 were rejected as anticipated under 35 U.S.C. § 102(e) by U.S. Patent No. 5,671,007 to Songer ("Songer").

(3) Claims 1 and 5-7 were rejected under 35 U.S.C. § 103(a) over the combined teachings of Songer and U.S. Patent Application Publication No. 2004/0252756 to Smith ("Smith").

(4) Claim 2 was rejected as being unpatentable under 35 U.S.C. § 103(a) over the combined teachings of Songer, Smith and U.S. Patent No. 5,870,137 to Stuettler ("Stuettler").

(5) Claim 3 was rejected as being unpatentable under 35 U.S.C. § 103(a) over the combined teachings of Songer, Smith, Stuettler and U.S. Patent Application Publication No. 2003/0234790 to Hochmuth et al. ("Hochmuth").

(6) Claim 4 was rejected as being unpatentable under 35 U.S.C. § 103(a) over the combined teachings of Songer, Smith and Hochmuth.

(7) Claims 14 and 41 were rejected as being unpatentable under 35 U.S.C. § 103(a) over the combined teachings of Songer, Smith and Sato (of record) ("Sato").

(8) Claims 8-10, 15, 18, 37, 38 and 42 were rejected as being unpatentable under 35 U.S.C. § 103(a) over the combined teachings of Songer, Smith and Divelbiss.

(9) Claims 12, 39 and 40 were rejected as being unpatentable under 35 U.S.C. § 103(a) over the combined teachings of Songer, Smith, Divelbiss and U.S. Patent Application Publication No. 2005/0037843 to Wells et al. ("Wells").

(10) Claim 13 was rejected being unpatentable under 35 U.S.C. § 103(a) over the combined teachings of Songer, Smith, Divelbiss and Anderson (of record) ("Anderson").

(11) Claims 16, 17, 43 and 44 were rejected as being unpatentable under 35 U.S.C. § 103(a) over the combined teachings of Songer, Smith, Divelbiss and Bolas (of record) ("Bolas").

(12) Claims 61, 64, 65 and 67 was rejected as being unpatentable under 35 U.S.C. § 103(a) over the combined teachings of Songer, Smith and Taniguchi (of record) ("Taniguchi").

(13) Claim 30 was rejected as being unpatentable under 35 U.S.C. § 103(a) over the combined teachings of Songer and Stuettler.

(14) Claims 31 and 32 were rejected as being unpatentable under 35 U.S.C. § 103(a) over the combined teachings of Songer, Stuettler and Hochmuth.

(15) Claim 36 was rejected as being unpatentable under 35 U.S.C. § 103(a) over the combined teachings of Songer and Divelbiss.

(16) Claim 47 was rejected being unpatentable under 35 U.S.C. § 103(a) over the combined teachings of Songer and Anderson.

(17) Claims 50 and 54 were rejected as being unpatentable under 35 U.S.C. § 103(a) over the combined teachings of Divelbiss and Stuettler.

(18) Claims 51 and 52 were rejected as being unpatentable under 35 U.S.C. § 103(a) over the combined teachings of Divelbiss and Bolas.

(19) Claims 57 and 58 were rejected as being unpatentable under 35 U.S.C. § 103(a) over the combined teachings of Divelbiss and Songer.

(20) Claims 62 and 63 were rejected as being unpatentable under 35 U.S.C. § 103(a) over the combined teachings of Songer, Smith, Taniguchi and Stuettler.

Appellant respectfully requests review of these grounds of rejection as necessitated by the following arguments.

VII. Argument

Claim 19 is patentable over Divelbiss:

Original independent claim 19 recites:

> A method of displaying an image in three dimensions during a frame period, said method comprising:
>
> generating a left image sub-frame and a right image sub-frame, said left image sub-frame defining a visual perspective of a left eye and said right image sub-frame defining a visual perspective of a right eye for said image;
>
> displaying said left image sub-frame with an electronic display system, wherein said electronic display system outputs a display of said left image sub-frame utilizing a first plurality of colors; and
>
> displaying said right image sub-frame with said display system, wherein said display system outputs a display of said right image sub-frame utilizing a second plurality of colors;
>
> *wherein said first plurality of colors is distinct from said second plurality of colors.*

(Emphasis added).

In contrast, Divelbiss does not teach or suggest a method in which left and right image sub-frames are *displayed* on an electronic display system utilizing distinct pluralities of colors.

Appellant wishes to note that claim 19 recites *displaying* the left sub-frame using a first plurality of colors and the right sub-frames using a second, different plurality of colors. Moreover, this "displaying" occurs on *"an electronic display system."* This is prior to, and without reference to, colored filter glasses that may change the way a viewer perceives the displayed image. The final Office Action gets hung up on the use of filter glasses as taught by Divelbiss, which is entirely irrelevant to what is being recited in claim 19. Claim 19 does not mention filter glasses. The claim recites that the sub-frames are themselves displayed on the electronic display system using the two distinct pluralities of colors. This means that a

separate set of colors is used *on the electronic display* to generate/display each of the two sub-frames respectively, irrespective of what colors are perceived by a viewer wearing filter glasses.

In this regard, the Office Action cites Divelbiss at paragraph 222. (Action of 11/24/06, p. 5). This portion of Divelbiss is irrelevant to the claimed method. At paragraph 222, Divelbiss does not discuss the colors with which an image is displayed *on an electronic display system*. Rather, this portion of Divelbiss teaches "active color filter glasses" where one filter or lens transmits magenta and the other transmits green. (Divelbiss, paragraph 0222, last sentence).

In the system taught by Divelbiss, the image is always displayed on the display device with the same set of primary colors, *only a single plurality of colors*, (RGB see Fig. 43). Thus, Divelbiss cannot teach or suggest displaying different sub-frames with different pluralities of colors as recited in claim 19.

The Divelbiss viewer wears filter glasses that pass two different colors, magenta (red + blue) and green, respectively to the viewer's two eyes. Divelbiss never teaches or suggests that left and right image sub-frames are displayed on an electronic display system using different pluralities of colors as claimed. Divelbiss does not teach or suggest "displaying said left image sub-frame with an electronic display system, wherein said electronic display system outputs a display of said left image sub-frame utilizing a first plurality of colors; and displaying said right image sub-frame with said display system, wherein said display system outputs a display of said right image sub-frame utilizing a second plurality of colors, wherein said first plurality of colors is distinct from said second plurality of colors."

Moreover, the color scheme used by Divelbiss includes one filter/lens that passes green and one filter lens that passes magenta. (Divelbiss, paragraph 0222, last sentence).

However, green is not a "plurality" of colors. Green is a single color. Consequently, even if Divelbiss, as cited in the final Office Action, were discussing the display of sub-frames rather than filter glasses, Divelbiss would still not teach or suggest a scheme in which left and right sub-frames are each presented using a distinct ***plurality*** of colors, i.e, two different pluralities of colors.

"A claim is anticipated [under 35 U.S.C. § 102] only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference." *Verdegaal Bros. v. Union Oil Co. of California*, 2 U.S.P.Q.2d 1051, 1053 (Fed. Cir. 1987) (emphasis added). See M.P.E.P. § 2131. For at least these reasons, the rejection of claim 19 and its dependent claims based on Divelbiss should not be sustained.

Claim 48 is patentable over Divelbiss:

Similarly, independent claim 48 recites:

> A 3D imaging device, comprising:
> an image processing unit configured to generate image sub-frame data; and
> *a color modulator electronically coupled to said image processing unit* and configured to generate a plurality of image sub-frames based on said image sub-frame data;
> *wherein said color modulator uses a first plurality of colors to output at least one image sub-frame of said plurality of image sub-frames and a second plurality of colors, distinct from said first plurality of colors, to output at least one other image sub-frame* of said plurality of image sub-frames.

(Emphasis added).

Thus, claim 48 specifically recites the hardware of a color modulator electronically coupled to an image processing unit that used two different pluralities of colors to output different image sub-frames.

As demonstrated above, Divelbiss fails to teach or suggest a color modulator that is electronically coupled to an image processing unit and that "uses a first plurality of colors to

output at least one image sub-frame of said plurality of image sub-frames and a second plurality of colors, distinct from said first plurality of colors, to output at least one other image sub-frame of said plurality of image sub-frames." Divelbiss does not teach or suggest a color modulator electronically coupled to an image processing unit that uses distinct pluralities of colors to generate different sub-frames.

As before, "[a] claim is anticipated [under 35 U.S.C. § 102] only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference." *Verdegaal Bros. v. Union Oil Co. of California*, 2 U.S.P.Q.2d 1051, 1053 (Fed. Cir. 1987) (emphasis added). See M.P.E.P. § 2131. For at least this reason, the rejection of claim 48 and its dependent claims based on Divelbiss should not be sustained.

Claim 66 is patentable over Divelbiss:

Additionally, independent claim 66 recites:

> A system for displaying an image in three dimensions during a frame period, said system comprising:
> means for generating a left image sub-frame and a right image sub-frame, said left image sub-frame defining a visual perspective of a left eye and said right image sub-frame defining a visual perspective of a right eye for said image;
> *means for electronically displaying said left image sub-frame utilizing a first plurality of colors to compose the display of the left image sub-frame; and*
> *means for electronically displaying said right image sub-frame utilizing a second plurality of colors to compose the display of the right image sub-frame;*
> *wherein said first plurality of colors is distinct from said second plurality of colors.*

(Emphasis added).

As demonstrated above, Divelbiss fails to teach or suggest a system including means for displaying left and right image sub-frames utilizing distinct first and second pluralities of colors. As before, "[a] claim is anticipated [under 35 U.S.C. § 102] only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single

prior art reference." *Verdegaal Bros. v. Union Oil Co. of California*, 2 U.S.P.Q.2d 1051, 1053 (Fed. Cir. 1987) (emphasis added). See M.P.E.P. § 2131. For at least this reason, the rejection of claim 66 based on Divelbiss should not be sustained.

Claims 20 and 49 are patentable over Divelbiss:

Additionally, dependent claim 20 recites "wherein said first plurality of colors and said second plurality of colors comprise different sets of primary colors." Claim 49 recites similar subject matter.

As explained in Appellant's specification and as well known in the art, there are different sets of primary colors from which all other colors can be derived. For example, red, green and blue are considered a set of primary colors. Cyan, yellow and magenta are considered another set of primary colors. (Appellant's specification, paragraph 0047).

As demonstrated, Divelbiss does not teach or suggest first and second pluralities of colors. The Divelbiss system uses viewing glasses that distinguish between green and magenta. Consequently, Divelbiss certainly does not teach or suggest "different sets of *primary* colors" as claimed. Divelbiss only teaches a single set of primary colors, red, green and blue. (Divelbiss, paragraph 0048-0059). For at least this additional reason, claims 20 and 49 should be held clearly patentable over Divelbiss.

Claim 1 is patentable over Songer and Smith:

Claim 1 recites:

> A method of displaying an image frame by projection in three dimensions (3D) or in two dimensions (2D) with a projection system, said method comprising:
> selecting between a 2D mode of operation and a separate 3D mode of operation for said projection system;

generating and projecting a left image sub-frame and a right image sub-frame during a frame period if said 3D mode of operation for said projection system is selected; and

generating and projecting only a 2D image frame during said frame period if said 2D mode of operation for said projection system is selected;

wherein said left image sub-frame defines a visual perspective of a left eye and said right image sub-frame defines a visual perspective of a right eye.

(emphasis added).

In contrast, Songer does not teach or suggest a method of displaying an image that involves selectively operating in one of two separate modes. Songer does not teach or suggest that sub-frames are generated in a 3D mode and only full image frames are generated in a 2D mode. These facts are expressly acknowledged in the recent Office Action. (Action of 11/24/06, p. 11).

Consequently, the Action cites to Smith on these points. However, Smith in combination with Songer still fails to teach or suggest the claimed method. Smith, like Divelbiss above, teaches special "stereo glasses" that enable a viewer to see in 3D. Smith teaches adding "a color code or bar code to the video signal to tag the signal or a portion thereof as containing three dimensional video sequences. This code can be detected by the stereo glasses controller 26, and upon such detection, the stereo glasses 24 can be turned on to facilitate 3D viewing (e.g., open and closed the shutter lens in coordination with the video signal). At the end of the display of 3D video content, another code can be added to the video signal to instruct the stereo glasses controller 26 to return the stereo glasses 24 to a 2D viewing mode (e.g., open both lens so that both the left and right eyes of the viewer can see the display 3)." (Smith, paragraph 0026)

Consequently, Smith merely teaches a trigger for alerting the stereo glasses whether to function for 3D or 2D viewing. Smith, in combination with Songer, does not teach or suggest "selecting between a 2D mode of operation and a separate 3D mode of operation for said

projection system" including "***generating*** and projecting a left image sub-frame and a right image sub-frame during a frame period if said 3D mode of operation for said projection system is selected; and ***generating*** and projecting only a 2D image frame during said frame period if said 2D mode of operation for said projection system is selected." There is no connection taught in Smith or Songer between the operating mode selected and the type of frame/sub-frame that is then accordingly generated. Thus, Smith in combination with Songer does not teach or suggest generating sub-frames in a 3D mode or generating only regular image frames in a 2D mode of operation as claimed..

"To establish prima facie obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art. *In re Royka*, 490 F.2d 981, 180 USPQ 580 (CCPA 1974)." M.P.E.P. § 2143.03. Accord. M.P.E.P. § 706.02(j). For at least this additional reason, the rejection of claim 1 and its dependent claims based on a combination of Songer and Smith should not be sustained.

Claim 27 is patentable over Songer:

Independent claim 27 recites:

> A display system with a selectable mode of operation for displaying an image frame in three dimensions (3D) or in two dimensions (2D), said system comprising:
> a spatial light modulator; and
> *an image processing unit configured to control said spatial light modulator in a selected mode of operation which is either a 3D mode of operation or a 2D mode of operation*;
> wherein if said selected mode of operation is said 3D mode of operation, said image processing unit outputs to said spatial light modulator a left image sub-frame carrying a left eye perspective and a right image sub-frame carrying a right eye perspective during a frame period and, if said selected mode of operation is said 2D mode of operation, said image processing unit outputs to said spatial light modulator a 2D image frame to be displayed on a viewing surface during said frame period.

(emphasis added).

In contrast, Songer does not teach or suggest any of the subject matter of claim 27. First, Songer does not teach or suggest a spatial light modulator. Songer teaches a "system and method for imaging and viewing, by a viewer, color and monochrome three-dimensional and two-dimensional. images for broadcasting in accordance with NTSC, PAL, SECAM, and other world-wide electronic viewing formats." (Songer, abstract). The broadcast signal is display, for example, on a television set. (Songer, Fig. 1). Songer does not mention a spatial light modulator.

More importantly, Songer does not teach or suggest the claimed image processing unit configured to control a spatial light modulator where "if said selected mode of operation is said 3D mode of operation, said image processing unit outputs to said spatial light modulator a left image sub-frame carrying a left eye perspective and a right image sub-frame carrying a right eye perspective during a frame period and, if said selected mode of operation is said 2D mode of operation, said image processing unit outputs to said spatial light modulator a 2D image frame to be displayed on a viewing surface during said frame period." Rather, Songer teaches that the "plurality of left-eye images and the plurality of right-eye images appear three-dimensional when viewed through the pair of viewing glasses, and appear two-dimensional when viewed without the glasses." (Songer, abstract). Thus, the display remains the same, but "appear[s] three-dimensional when viewed through the pair of viewing glasses, and appear[s] two-dimensional when viewed without the glasses." (*Id.*). Clearly, Songer does not teach or suggest the claimed image processing unit that controls a spatial light modulator differently in a 3D mode than a 2D mode. Rather, Songer merely teaches a display that remains constant, but may be viewed with or without special glasses.

Thus, Songer fails to teach or suggest either the spatial light modulator or the image processing unit as recited in claim 27. "To establish prima facie obviousness of a claimed

invention, all the claim limitations must be taught or suggested by the prior art. *In re Royka*, 490 F.2d 981, 180 USPQ 580 (CCPA 1974)." M.P.E.P. § 2143.03. Accord. M.P.E.P. § 706.02(j). For at least this additional reason, the rejection of claim 27 and its dependent claims based on Songer should not be sustained.

Claim 61 is patentable over Songer, Smith and Taniguchi:

Independent claim 61 recites:

> A system for displaying an image frame by projection in three dimensions (3D) or in two dimensions (2D) with a projection system, said system comprising:
> means for selecting between a 2D mode of operation and a separate 3D mode of operation for said projection system;
> means for generating and projecting a left image sub-frame and a right image sub-frame if said 3D mode of operation is selected for said projection system; and
> means for generating and projecting a 2D image frame if said 2D mode of operation is selected for said projection system;
> wherein said left and right image sub-frames are left and right perspectives during a frame period if said 3D mode of operation is selected and said 2D image frame is displayed during said frame period if said 2D mode of operation is selected;
> wherein said 2D image frame does not comprise sub-frames having different perspectives.

As noted above, this claim is rejected based on a proposed combination of the teachings of Songer, Smith and Taniguchi. However, that proposed combination of prior art teachings is unreasonable and would not have been obvious to one of skill in the art.

The teachings of Songer/Smith and Taniguchi work on entirely different principles and are incompatible. Songer and Smith both teach systems in which 3D images are perceived using mechanical viewing glasses with left and right light valves that open and close at a field rate and in synchronization with a displayed 3D image. (Songer, abstract; Smith, paragraph 0026).

In contrast, Taniguchi teaches a "parallax optic" that is selectively activated over an LCD to generate a perception of 3D viewing. (Taniguchi, paragraph 0009). This technique

for creating a 3D display would not work with, and cannot be used in, a projected display. Claim 61 is a projection display system with "means for generating *and projecting* 3D mode sub-frames or 2D mode image frames. Similarly, Songer relates to a projection display system.

Accordingly, the final Office Action fails to satisfactorily explain how or why these very different systems could be combined to approximate the claimed invention or why one of skill in the art would have found it obvious to do so. Consequently, the teachings of Taniguchi cannot reasonably be combined with those of Songer and Smith as proposed in the final Office Action.

It should also be remembered that, "[i]f the proposed modification or combination of the prior art would change the principle of operation of the prior art invention being modified, then the teachings of the references are not sufficient to render the claims prima facie obvious. *In re Ratti*, 270 F.2d 810, 123 USPQ 349 (CCPA 1959)." M.P.E.P. § 2143.01. See also, *Gillette Co. v. S.C. Johnson & Son, Inc.*, 919 F.2d 720 (Fed. Cir. 1990) ("An analysis of obviousness of a claimed combination must include consideration of the results achieved by that combination.").

For any and all of these reasons, the proposed combination of Songer, Smith and Taniguchi does not render claim 61 obvious. Consequently, the rejection of claim 61 and its dependent claims should not be sustained.

In view of the foregoing, it is submitted that the final rejection of the pending claims is improper and should not be sustained. Therefore, a reversal of the Final Rejection of November 24, 2006 is respectfully requested.

Respectfully submitted,

DATE: January 23, 2007

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VIII. CLAIMS APPENDIX

1. (previously presented) A method of displaying an image frame by projection in three dimensions (3D) or in two dimensions (2D) with a projection system, said method comprising:

selecting between a 2D mode of operation and a separate 3D mode of operation for said projection system;

generating and projecting a left image sub-frame and a right image sub-frame during a frame period if said 3D mode of operation for said projection system is selected; and

generating and projecting only a 2D image frame during said frame period if said 2D mode of operation for said projection system is selected;

wherein said left image sub-frame defines a visual perspective of a left eye and said right image sub-frame defines a visual perspective of a right eye.

2. (previously presented) The method of claim 1, wherein generating said left and right image sub-frames comprises:

generating left and right image sub-frame data defining said left and right image sub-frames;

storing said left image sub-frame data in a first buffer;

storing said right image sub-frame data in a second buffer; and

controlling a spatial light modulator with said left and right image sub-frame data in said first and second buffers to generate said left and right image sub-frames.

3. (original) The method of claim 2, wherein a single buffer unit comprises said first and second buffers.

4. (previously presented) The method of claim 1, wherein generating said 2D image frame comprises:

generating 2D image frame data defining said 2D image frame;

storing said 2D image frame data in a buffer; and

controlling a spatial light modulator with said 2D image frame data in said buffer to generate said 2D image frame.

5. (original) The method of claim 1, further comprising:

dividing said frame period into a first sub-frame period and a second sub-frame period;

displaying said left image sub-frame during said first sub-frame period; and

displaying said right image sub-frame during said second sub-frame period.

6. (original) The method of claim 1, further comprising:

dividing said frame period into a number of sub-frame periods;

displaying said left image sub-frame during one or more of said sub-frame periods; and

displaying said right image sub-frame during one or more of said sub-frame periods;

wherein said left and right image sub-frames are displayed in an interleaved manner.

7. (original) The method of claim 1, further comprising viewing said left and right image sub-frames through glasses comprising a left lens configured to allow a left eye to only perceive said left image sub-frame and a right lens configured to allow a right eye to only perceive said right image sub-frame.

8. (original) The method of claim 1, wherein said left image sub-frame comprises a first group of colors and said right image sub-frame comprises a second group of colors distinct from said first group of colors.

9. (original) The method of claim 8, wherein said 2D image frame comprises one or more of said colors in said first and second groups of colors.

10. (original) The method of claim 8, wherein said first group of colors comprises two or more colors and said second group of colors comprises two or more colors.

11. (original) The method of claim 8, wherein said first group of colors comprises red, green, and blue and said second group of colors comprises cyan, yellow, and magenta.

12. (original) The method of claim 8, further comprising generating said colors in said first and second groups of colors with a sequential color device.

13. (original) The method of claim 8, further comprising generating said colors in said first and second group of colors with a scrolling color device.

14. (original) The method of claim 8, further comprising generating said colors in said first and second groups of colors with a parallel color device.

15. (original) The method of claim 8, further comprising generating said colors in said first and second groups of colors with a diffractive light device.

16. (original) The method of claim 15, further comprising notch filtering light incident upon said diffractive light device.

17. (original) The method of claim 15, further comprising notch filtering light reflecting from said diffractive light device.

18. (original) The method of claim 1, wherein said left image sub-frame and said right image sub-frame have differing polarizations.

19. (previously presented) A method of displaying an image in three dimensions during a frame period, said method comprising:

generating a left image sub-frame and a right image sub-frame, said left image sub-frame defining a visual perspective of a left eye and said right image sub-frame defining a visual perspective of a right eye for said image;

displaying said left image sub-frame with an electronic display system, wherein said electronic display system outputs a display of said left image sub-frame utilizing a first plurality of colors; and

displaying said right image sub-frame with said display system, wherein said display system outputs a display of said right image sub-frame utilizing a second plurality of colors;

wherein said first plurality of colors is distinct from said second plurality of colors.

20. (original) The method of claim 19, wherein said first plurality of colors and said second plurality of colors comprise different sets of primary colors.

21. (original) The method of claim 19, further comprising:

dividing said frame period into a plurality of sub-frame time periods including at least one left sub-frame time period and one right sub-frame time period;

displaying said left image sub-frame during said at least one left sub-frame time period; and

displaying said right sub-frame image during said at least one right image sub-frame time period.

22. (original) The method of claim 19, wherein said left image sub-frame is displayed during a first portion of said frame period and said right image sub-frame is displayed during a second portion of said frame period, wherein said first portion and said second portion are overlapping.

23. (original) The method of claim 19, wherein said first plurality of colors includes red, green, and blue.

24. (previously presented) The method of claim 25, wherein said second plurality of colors includes red, green, and blue.

25. (original) The method of claim 19, wherein said first plurality of colors includes cyan, yellow, and magenta.

26. (original) The method of claim 19, wherein said second plurality of colors includes cyan, yellow, and magenta.

27. (previously presented) A display system with a selectable mode of operation for displaying an image frame in three dimensions (3D) or in two dimensions (2D), said system comprising:

a spatial light modulator; and

an image processing unit configured to control said spatial light modulator in a selected mode of operation which is either a 3D mode of operation or a 2D mode of operation;

wherein if said selected mode of operation is said 3D mode of operation, said image processing unit outputs to said spatial light modulator a left image sub-frame carrying a left eye perspective and a right image sub-frame carrying a right eye perspective during a frame period and, if said selected mode of operation is said 2D mode of operation,

said image processing unit outputs to said spatial light modulator a 2D image frame to be displayed on a viewing surface during said frame period.

28. (original) The system of claim 27, wherein said image processing unit comprises:

a 3D coordinate conversion function configured to generate left and right image sub-frame data defining said left and right image sub-frames;

wherein said spatial light modulator is configured to generate said left and right image sub-frames in accordance with said left and right image sub-frame data.

29. (original) The system of claim 28, wherein said image processing unit further comprises:

a 2D coordinate conversion function configured to generate 2D image frame data defining said 2D image frame;

wherein said spatial light modulator is further configured to generate said 2D image frame in accordance with said 2D image frame data.

30. (original) The system of claim 29, further comprising:

a first buffer for storing said left image sub-frame data to be used by said spatial light modulator to generate said left image sub-frame;

a second buffer for storing said right image sub-frame data to be used by said spatial light modulator to generate said right image sub-frame; and

a third buffer for storing said 2D image frame data to be used by said spatial light modulator to generate said 2D image frame.

31. (original) The system of claim 30, wherein a single buffer unit comprises said first, second, and third buffers.

32. (original) The system of claim 30, wherein a single buffer unit comprises said first and second buffers.

33. (original) The system of claim 27, wherein said frame period comprises a first sub-frame period and a second sub-frame period, said left image sub-frame being displayed during said first sub-frame period and said right image sub-frame being displayed during said second sub-frame period.

34. (original) The system of claim 27, wherein said frame period comprises a number of sub-frame periods, wherein said left and right image sub-frames are each displayed during one or more of said sub-frame periods in an interleaved manner.

35. (original) The system of claim 27, further comprising glasses, said glasses comprising:

a left lens configured to allow a left eye of a user of said glasses to only perceive said left image sub-frame; and

a right lens configured to allow a right eye of a user of said glasses to only perceive said right image sub-frame.

36. (original) The system of claim 27, wherein said left image sub-frame comprises a first group of colors and said right image sub-frame comprises a second group of colors distinct from said first group of colors.

37. (previously presented) The system of claim 36, wherein said 2D image frame comprises one or more of said colors in said first and second groups of colors.

38. (previously presented) The system of claim 36, wherein said first group of colors comprises two or more colors and said second group of colors comprises two or more colors.

39. (previously presented) The system of claim 36, wherein said system further comprises a sequential color device configured to generate said colors in said first and second groups of colors.

40. (original) The system of claim 39, wherein said sequential color device is a color filter wheel.

41. (previously presented) The system of claim 36, wherein said system further comprises a parallel color device configured to generate said colors in said first and second groups of colors.

42. (previously presented) The system of claim 36, wherein said spatial light modulator comprises a diffractive light device configured to generate said colors in said first and second groups of colors.

43. (original) The system of claim 42, further comprising one or more notch filters configured to notch filter light incident upon said diffractive light device.

44. (original) The system of claim 42, further comprising one or more notch filters configured to notch filter light reflected from said diffractive light device.

45. (original) The system of claim 27, wherein said mode of operation is selected by a user of said display system.

46. (original) The system of claim 27, wherein said mode of operation is selected automatically without user intervention.

47. (original) The system of claim 27, wherein said spatial light modulator is selected from the group consisting of an analog based light modulator, a pulse-width modulation based light modulator, a liquid crystal display (LCD) panel, a liquid crystal on silicon (LCOS) device, a diffractive light device (DLD), and an array of micromirrors.

48. (previously presented) A 3D imaging device, comprising:

an image processing unit configured to generate image sub-frame data; and

a color modulator electronically coupled to said image processing unit and configured to generate a plurality of image sub-frames based on said image sub-frame data;

wherein said color modulator uses a first plurality of colors to output at least one image sub-frame of said plurality of image sub-frames and a second plurality of colors, distinct from said first plurality of colors, to output at least one other image sub-frame of said plurality of image sub-frames.

49. (original) The 3D imaging device of claim 48, wherein said first plurality of colors and said second plurality of colors comprise different sets of primary colors.

50. (original) The 3D imaging device of claim 48, further comprising one or more image sub-frame buffers for storing said image sub-frame data generated by said image processing unit.

51. (original) The 3D imaging device of claim 48, further comprising:

a light source for illuminating said color modulator; and

at least one notch filter disposed between said light source and said color modulator.

52. (original) The 3D imaging device of claim 48, further comprising at least one notch filter disposed between said color modulator and a viewing surface.

53. (original) The 3D imaging device of claim 48, further comprising:

at least one set of lenses having a first and second lens wherein said first lens filters out said first plurality of colors and said second lens filters out said second plurality of colors.

54. (original) The 3D imaging device of claim 48, wherein said color modulator displays said at least one image sub-frame and said at least one other image sub-frame buffer during one frame period.

55. (original) The 3D imaging device of claim 48, wherein said color modulator displays said at least one image sub-frame and said at least one other image sub-frame at the same time during one frame period.

56. (original) The 3D imaging device of claim 48, wherein said color modulator includes an array of pixels and is configured to display said at least one image sub-frame and said at least one other image sub-frame in alternating adjacent pixels during at least a portion of one frame period.

57. (original) The 3D imaging device of claim 48, wherein said imaging processing unit is further configured to generate 2D image frame data, wherein said color modulator generates a 2D image frame based on said 2D image frame data.

58. (original) The 3D imaging device of claim 57, wherein said 2D image frame includes said first set of primary colors and said second set of primary colors.

59-60. (withdrawn)

61. (previously presented)A system for displaying an image frame by projection in three dimensions (3D) or in two dimensions (2D) with a projection system, said system comprising:

means for selecting between a 2D mode of operation and a separate 3D mode of operation for said projection system;

means for generating and projecting a left image sub-frame and a right image sub-frame if said 3D mode of operation is selected for said projection system; and

means for generating and projecting a 2D image frame if said 2D mode of operation is selected for said projection system;

wherein said left and right image sub-frames are left and right perspectives during a frame period if said 3D mode of operation is selected and said 2D image frame is displayed during said frame period if said 2D mode of operation is selected;

wherein said 2D image frame does not comprise sub-frames having different perspectives.

62. (original) The system of claim 61, wherein said means for generating said left and right image sub-frames comprises:

means for generating left and right image sub-frame data defining said left and right image sub-frames;

means for storing said left image sub-frame data in a first buffer;

means for storing said right image sub-frame data in a second buffer; and

means for controlling a spatial light modulator with said left and right image sub-frame data in said first and second buffers to generate said left and right image sub-frames.

63. (original) The system of claim 61, wherein said means for generating said 2D image frame comprises:

means for generating 2D image frame data defining said 2D image frame;

means for storing said 2D image frame data in a buffer; and

means for controlling a spatial light modulator with said 2D image frame data in said buffer to generate said 2D image frame.

64. (original) The system of claim 61, further comprising:

means for dividing said frame period into a first sub-frame period and a second sub-frame period;

means for displaying said left image sub-frame during said first sub-frame period; and

means for displaying said right image sub-frame during said second sub-frame period.

65. (original) The system of claim 61, further comprising:

means for dividing said frame period into a number of sub-frame periods;

means for displaying said left image sub-frame during one or more of said sub-frame periods; and

means for displaying said right image sub-frame during one or more of said sub-frame periods;

wherein said left and right image sub-frames are displayed in an interleaved manner.

66. (previously presented) A system for displaying an image in three dimensions during a frame period, said system comprising:

means for generating a left image sub-frame and a right image sub-frame, said left image sub-frame defining a visual perspective of a left eye and said right image sub-frame defining a visual perspective of a right eye for said image;

means for electronically displaying said left image sub-frame utilizing a first plurality of colors to compose the display of the left image sub-frame; and

means for electronically displaying said right image sub-frame utilizing a second plurality of colors to compose the display of the right image sub-frame;

wherein said first plurality of colors is distinct from said second plurality of colors.

67. (previously presented) The method of claim 1, wherein generating said left and right image sub-frames and said 2D image frame comprises:

storing said left and right image sub-frames in a first buffer; and

storing said 2D image frame data in a second buffer; and

controlling a spatial light modulator with data from either said first or second buffer depending on the selected mode of operation.

IX. Evidence Appendix

None

X. Related Proceedings Appendix

None

XI. Certificate of Service

None